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ART 34 AND
ART 35

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

10/532761

27 APR 2005

Applicant's or agent's file reference RSJ07617WO		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/04771	International filing date (day/month/year) 05.11.2003	Priority date (day/month/year) 06.11.2002	
International Patent Classification (IPC) or both national classification and IPC G01R33/30			
Applicant OXFORD INSTRUMENTS SUPERCONDUCTIVITY LIMITED et al			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand 19.05.2004		Date of completion of this report 25.06.2004	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Skalla, J Telephone No. +49 89 2399-2252	



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB 03/04771**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-5 as originally filed

Claims, Numbers

1-10 received on 19.05.2004 with letter of 18.05.2004

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB 03/04771**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-10
	No: Claims	
Inventive step (IS)	Yes: Claims	1-10
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	

2. Citations and explanations

see separate sheet

1. Cited documents:

Reference is made to the following documents cited in the international search report:

D1: US-A-US2003/0098689;

D2: Butler E.: "AVANCE SGU Based Frequency Generation, Beginners Guide, Version 001", 27.06.2002.

2. Reasoned statement under Rule 66(2)(a)(ii) PCT:

Novelty and inventive step (Art. 33(2)(3) PCT) of claims 1-10:

Claim 1:

An apparatus according to the preamble of claim 1 is known from the applicants' own prior art, see page 1, l. 18/19. It is further known from D2, see, for instance Fig. 4.2 therein.

The apparatus according to the invention is further characterized in that the RF receiving and generating coils are located in a reduced diameter section of the probe at its leading end, at least some of the shim coils being located on a support surrounding the reduced diameter section. It is to be noted that the section of the probe of D2, Fig. 4.2 which is surrounded by the shim coils could likewise be considered to be a "reduced diameter section" considering that it is not defined with respect to which other diameter the section's diameter is reduced. It is therefore considered, for comparison of the claims with the prior art, that the probe when inserted in the bore has different diameter sections within the bore.

Thus, the present apparatus is mainly distinguished from prior art in that the shim coil support is coupled with the sample support, so that the shim coils surround the reduced diameter section. Preferably, the shim coil support is integrally formed with the sample support.

These features have the effect of giving a higher flexibility in accommodating the components of the apparatus. Thus, the characterising features of claim 1 can be considered to solve the problem that it was difficult to accommodate all components into the bore of the prior art apparatus because of the restricted available space.

Although the problem of accommodating components such as probe head, tuning circuits etc. within the bore of a magnet was known to someone skilled in the art, the specific solution as indicated above is not hinted at in the available prior art.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/04771

In particular, document D1 which is no prior art makes reference to a prior art apparatus (Fig. 2) which is similar to that disclosed in present Fig. 1 and which seems to correspond to that known from D2, Fig. 4.2. A shim coil can surround the section of the probe carrying the RF coil(s). However, nothing hints at a coupling of the shim coils with the reduced diameter section. Even if, for some reason, the skilled person was prompted to couple the shim coils with the probe, he would still not arrive at the invention, taking into account the clarification given above, because the shims would not be situated within a region of the support which has a reduced diameter compared to other parts of the probe within the bore.
Thus, claim 1 is inventive.

Claims 2-10:

These claims define additional features and are therefore inventive as well.

The following points would have to be taken note of in case of prosecution of the application in a regional phase. At least when entering the regional phase at the EPO, they would give rise to objections under the corresponding provisions of the EPC.

(I) Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D2 is not mentioned in the description, nor is this document identified therein.

(ii) The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

(iii) The description on p. 2 is not in conformity with the amended claims as required by Rule 5.1(a)(iii) PCT.

CLAIMS

1. Apparatus for use in a NMR system, the apparatus comprising a magnetic field generator surrounding a bore, for generating a magnetic field in a working volume located in the bore; a sample support which can be removably inserted into a first end of the bore so as to locate a sample in the working region; a probe carrying RF generating and receiving coils and which can be removably inserted into the other, second end of the bore so as to locate the RF coils adjacent the working volume; and a set of shim coils located in the bore about the working volume and which cooperate with the magnetic field generator to create a magnetic field in the working volume of sufficient uniformity to perform a NMR experiment on a sample characterized in that the RF receiving and generating coils are located in a reduced diameter section of the probe at its leading end; and in that at least some of the shim coils are located on a support surrounding the reduced diameter section of the probe.
2. Apparatus according to claim 1, wherein the shim coil support is coupled, preferably integrally formed, with the sample support.
3. Apparatus according to claim 1 or claim 2, wherein the reduced diameter section of the probe includes other shim coils.
4. Apparatus according to claim 3, wherein the reduced diameter section of the probe includes axial field shim coils.
5. Apparatus according to claim 3, wherein the reduced diameter section of the probe includes radial field shim coils.
6. Apparatus according to any of the preceding claims, wherein the reduced diameter section of the probe terminates at a wider diameter section, the wider diameter section substantially filling the bore cross-section.

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7. Apparatus according to claim 6, wherein all the shim coils are located axially spaced from the wider diameter section of the probe.
8. Apparatus according to any of the preceding claims,
5 wherein the reduced diameter section of the probe supports one or more gradient coils.
9. Apparatus according to any of the preceding claims, wherein the sample support comprises a tube.
10. Apparatus according to any of the preceding claims,
10 wherein the sample support includes a mechanism for rotating the sample within the working volume.
11. Apparatus according to any of the preceding claims, wherein the magnetic field generator comprises a superconducting coil.